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## Copyright Law and Integrated Circuit Protection: When the Chips Are Down, 6 *Computer L.J.* 543 (1985)

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# COPYRIGHT LAW AND INTEGRATED CIRCUIT PROTECTION: WHEN THE CHIPS ARE DOWN. . .<sup>†\*</sup>

Copyright law originated in the common law of Great Britain as a legal remedy for unfair appropriations of an author's literary works.<sup>1</sup> Currently, copyright protection extends to a far broader range of expressions.<sup>2</sup> Despite this broad coverage, however, the rapid expansion of the computer and information-processing industry<sup>3</sup> has resulted in a disparity between the protection offered by the present law and the needs of this industry to protect its secrets, expressions, and inventions.<sup>4</sup>

The courts<sup>5</sup> and Congress<sup>6</sup> have grappled with the issues presented by the technological and economic revolution of computers. The Copy-

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\* National Third Place, Second Annual Computer Law Writing Competition.

1. See generally E. PLOMAN & L. HAMILTON, COPYRIGHT 4-21 (1980) (historical discussion of the development of the copyright law).

2. Musical, dramatic, pantomime, pictorial, graphic, and sculptural works, as well as sound recordings, motion pictures, and computer programs are specifically protected by copyright law. See 17 U.S.C. § 101 (1982).

3. In 1984, it was estimated that over \$65 billion would be spent on computers, and an additional \$16.2 billion on software. Taylor, *The Wizard Inside the Machines*, TIME, Apr. 16, 1984, at 56.

4. See H.R. REP. NO. 781, 98th Cong., 2d Sess. 3, reprinted in 1984 U.S. CODE CONG. & AD. NEWS 5750, 5752 [hereinafter cited as HOUSE REPORT]. See also Note, *Copyright Protection of Computer Program Object Code*, 96 HARV. L. REV. 1723, 1723 (1983).

5. See, e.g., *Apple Computer v. Franklin Computer Corp.*, 714 F.2d 1240 (3d Cir. 1983) [hereinafter cited as *Apple II*], rev'g 545 F. Supp. 812 (E.D. Pa. 1982) [hereinafter cited as *Apple I*], cert. dismissed, 104 S. Ct. 690 (1984).

6. In 1976, Congress enacted the first major revision of the copyright law since 1909. In doing so, it addressed several key technologically complex problems. General Revision of Copyright Law, Pub. L. No. 94-553, 90 Stat. 2541 (1976) (codified primarily at scattered sections of 17 U.S.C. (1982)) [hereinafter cited as Copyright Act of 1976]. The state of protection for software, however, was undetermined until 1980. See *infra* note 9. The Congressional authority for the Copyright Act flows from the federal Constitution, which provides that Congress shall have the power "to promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries." U.S. CONST. art. I, § 8, cl. 8. See also Fenning, *The Origin of the Patent and Copyright Clause of the Constitution*, 17 GEO. L.J. 109 (1928).

right Act of 1976,<sup>7</sup> and the amendments thereto recommended by the Commission on New Technological Uses of Copyright,<sup>8</sup> resolved many difficult issues of computer protection.<sup>9</sup> There remained, however, several key unresolved questions, including the scope of protection afforded computer programs permanently stored within a computer, never directly accessed by the user, which serve primarily to control internal computer operations,<sup>10</sup> as well as the degree of protection provided for configurations of the miniature circuits imprinted on silicon wafers, which comprise integrated circuits.<sup>11</sup>

The former issue was resolved by the United States Court of Appeals for the Third Circuit in *Apple II*.<sup>12</sup> The court held that the Copyright Act of 1976 extends protection to operating systems in ROM.<sup>13</sup> The protection afforded integrated circuits, however, never has been defined by American courts. The Legislature has recently enacted H.R. 6163, the last in a long line of legislative attempts to resolve this question.<sup>14</sup> This law provides a *sui generis* form of monopoly interest in in-

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7. *Supra* note 6.

8. Congress, recognizing the "inadequacy of the present law to deal with the range of problems arising from the use of copyrighted works in computer systems," deferred resolution of the computer copyright infringement question until the National Commission on New Technological Uses of Copyrighted Works, a blue-ribbon panel of lawyers, authors, and industry leaders, could more fully explore and resolve the issues. See H.R. REP. NO. 1581, 93d Cong., 2d Sess. 7, reprinted in 1974 U.S. CODE CONG. & AD. NEWS 6849, 6855. In July of 1978, the Commission submitted its final report. NATIONAL COMM'N ON NEW TECHNOLOGICAL USES OF COPYRIGHTED WORKS, FINAL REPORT (1979) [hereinafter cited as CONTU REPORT]. The report forms an important basis for analysis of computer law questions, since it is, in effect, the legislative history for the relevant portions of the Act of Dec. 12, 1980, Pub. L. No. 96-517, § 10, 94 Stat. 3015, 3028 (amending 17 U.S.C. §§ 101, 117 (1976)) [hereinafter cited as 1980 Amendments].

9. Before the 1980 Amendments, the state of protection for software was undetermined. See 17 U.S.C. § 117 (1976). Currently, computer programs are clearly protected. See 17 U.S.C. § 101 (1982) (defining "computer program"). Computer programs consisting of "a few obvious steps," or those which represent ideas which can be expressed only "in a limited number of ways," are not eligible for copyright protection. CONTU REPORT, *supra* note 8, at 20. This does not, however, preclude one from setting out to duplicate the functions of the program. *Id.* at 22.

10. For a description of operating systems, see *infra* note 29 and accompanying text. See also P. CALINGAERT, OPERATING SYSTEM ELEMENTS 2 (1982).

11. For a description of the technology of integrated circuit masks, see *infra* note 32 and accompanying text. For a discussion of legislation which has been considered in addressing this issue, see *infra* notes 132-72 and accompanying text.

12. 714 F.2d at 1240.

13. *Id.* at 1249.

14. 98th Cong., 2d Sess., 130 CONG. REC. S14616, H12287 (daily ed. Nov. 14, 1984) (enacted as the Semiconductor Chip Protection Act of 1984, Pub. L. No. 98-620, tit. III, 98 Stat. 3347 (codified at 17 U.S.C. §§ 901-914 (Supp. II 1985)) [hereinafter cited as Chip Act]. The relevant sections of the Chip Act are reproduced *infra* Appendix A. The law is discussed *infra* at notes 130-72 and accompanying text. Previous legislative attempts are

tegrated circuit designs, with elements of both patent and copyright law protection.

Questions regarding the extent of legal protection for operating systems in ROM and for integrated circuit masks are logically related. At the heart of both issues are the useful article doctrine<sup>15</sup> and the idea/expression dichotomy,<sup>16</sup> and the relationship of these concepts to copyright and patent laws. The useful article doctrine seeks to restrict copyright protection to expressions of ideas, leaving any useful mechanical or physical function of the idea unprotected. Patent law is more effective than copyright for the protection of useful or utilitarian functions, ideas, or processes.<sup>17</sup> This consideration is pivotal in dealing with computer programs of any sort, as well as designs for integrated circuits, since both have certain useful or utilitarian functions beyond mere expression.<sup>18</sup>

The idea/expression dichotomy restricts copyright protection to particular expressions of an idea. As a result of this restriction, one may not obtain copyright protection for an idea or process, but may exclude others from copying a particular expression of that idea. This concept is logically related to the useful article doctrine, in that patent law is considered the best method for protecting ideas. Both the idea/expression dichotomy and the useful article doctrine have to an extent been overlooked by the legislature in its attempt to adapt the copyright laws to rapidly advancing computer technology.

Part I of this Note briefly discusses the technology and terminology necessary to an understanding of the issues presented. Part II traces the judicial development of the useful article doctrine and the idea/expression dichotomy generally, and discusses the application of these concepts in the computer-copyright area. The Note then provides a detailed analysis of the application of these doctrines in *Apple II*.<sup>19</sup> Part III examines the law of circuit design protection. The Note argues that

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listed *infra* at note 153. For an excellent comparative analysis of the approach other nations, specifically Japan and West Germany, have taken in resolving the key issues of the legal protection of computer-related intellectual property, see Note, *Copyright Protection for Firmware: An International View*, 4 HASTINGS INT'L & COMP. L. REV. 473 (1981).

15. For a discussion of the useful article doctrine, see *infra* notes 76-92 and accompanying text.

16. For a discussion of the idea/expression dichotomy, see *infra* notes 54-75 and accompanying text.

17. See *infra* note 37.

18. For a description of the relevant technology, see *infra* notes 21-29, 32 and accompanying text. As Adam Osborne, a computer entrepreneur, put it: "A piece of software drives an engine—a piece of hardware—causing it to do certain things. A book doesn't make anything happen . . ." Kushner, *Adam Osborne on Software Piracy*, The Recorder, Apr. 11, 1984, at 1, col. 4.

19. 714 F.2d at 1240.

the recently enacted Semiconductor Chip Protection Act<sup>20</sup> is ambiguous, because it establishes no standard for determining whether a given semiconductor design infringes upon a legally protected monopoly. Further, the Chip Act blurs the line between patent and copyright law, by affording quasi-copyright protection for purely utilitarian works previously protected exclusively by patent law, while granting quasi-patent protection for articles which are not novel. The Note advances a framework for applying the Chip Act in a manner consistent with the idea/expression dichotomy and the useful article doctrine of traditional copyright law.

## I. A GENERAL OVERVIEW OF THE RELEVANT TECHNOLOGY

### A. COMPUTER SOFTWARE

Computers are electronic devices which can store and process information. Computer programs are sets of instructions which can be used, either directly or indirectly, by a computer to achieve a certain result. Some programs, known as "machine language" programs, consist of series of ones and zeroes, representing "on" or "off" conditions. These programs can be used directly by the central processing unit of a computer. Other programs, the "higher-level" language programs, cannot be used directly by a computer, but must be translated into machine language.<sup>21</sup> It is in these higher-level languages, which frequently resemble English,<sup>22</sup> that software authors write their programs.

An author usually does not enter a program directly into the computer, but first works out the program using a flow chart<sup>23</sup> or other

20. *Supra* note 14.

21. Almost all operating systems have some sort of program which does this translation. For most microcomputers, this program is called an interpreter; its function is to interpret the computer language BASIC (Beginner's All-purpose Symbolic Instruction Code), line by line, so that the microprocessor can operate.

22. A sample BASIC program is:

```
10 REM SAMPLE PROGRAM
20 INPUT PRINCIPAL
30 LET INTEREST = .12
40 LET PAY = PRINCIPAL * INTEREST
50 PRINT PAY
60 END
```

The same idea, or algorithm, could be expressed in an entirely different way:

```
10 INPUT P: I=.12: R=P*I: PRINT R: END
```

These simple programs obtain the values for principal from the user, assume a value of 12% for the rate of interest, assign a variable to the value of the product of principal and rate, print that variable, and end. They both achieve the same result, although the latter program will run more quickly.

23. A flow chart is a diagram depicting the logical flow of a computer program. It can be analogized to an outline for a novel. It is protected by copyright, as is a working program. CONTU REPORT, *supra* note 8, at 21.

rough draft. The program is then entered into the computer memory,<sup>24</sup> either with punched paper cards, by typing the program at a keyboard which sends the data to the temporary memory,<sup>25</sup> or by imprinting the program directly onto a permanent memory chip.<sup>26</sup> Whether the program is stored in paper, disk, integrated circuit, or memory, it is legally<sup>27</sup> and technically<sup>28</sup> considered a creative, expressive work. An operating system program<sup>29</sup> is simply a program which controls the internal "housekeeping" operations of a computer, while an applications program usually interacts with the computer user.

## B. COMPUTER HARDWARE

There are several types of memory in a computer, including short-term, random-access memory (RAM) and permanent, read-only memory (ROM).<sup>30</sup> ROM is often referred to as firmware, because it is an amalgamation of "soft" computer programs and "hard" integrated circuits.<sup>31</sup>

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24. For a description of memory devices, see *infra* note 30.

25. Temporary memory is frequently referred to as RAM memory. See *infra* note 30. It usually is "volatile;" an interruption of power will erase the RAM's contents.

26. Permanent memory is frequently known as ROM memory, although it can take other forms. See *infra* note 30. It is unusual to store programs directly on ROM chips.

27. See *Apple II*, 714 F.2d at 1251; see *infra* notes 126-31 and accompanying text.

28. Of course, a computer program, unlike a novel or a play, also acts in concert with a machine to bring about action. The sample program, *supra* note 22, when translated into machine language, will set aside areas of memory for the variables, perform mathematical computations, and transform the results into something visible on the screen. Whether this brings the program within the useful article doctrine is discussed generally throughout the Note. The computer program itself, however, may be protected as a copyrightable "literary" work. See 17 U.S.C. § 101 (1982).

29. An operating system is generally any set of instructions which primarily control the internal operations of a computer system. It is usually—although not necessarily—encoded in a ROM chip. Such programs typically monitor the structure and usage of memory within the system, as well as the control of input and output. These operations are generally "transparent," in that the computer user never sees or participates in them. Thus, operating system programs perform "housekeeping" functions that keep the computer running. By contrast, an applications program frequently requires the user to enter responses to various questions, or raw data, and the program instructs the computer what to do with these responses.

30. Although RAM is an acronym for Random-Access Memory, almost all electronic memory is random-access. RAM memory, however, can be altered or read easily, while the memory circuit of ROM, or Read-Only Memory, is permanently "burned in" with one set of data, and cannot be altered by the user. Other types of memory include PROMs, EPROMs, and EEPROMs, exotic hybrids of RAM and ROM memory. The RAM memory is the sort most usually considered in evaluating the "memory power" of a computer. The contents of this memory can be stored, changed, deleted, or replaced by the user. Operating system programs are usually found on ROM chips. See *generally* Note, *Copyright Protection for Firmware*, 4 HASTINGS INT'L & COMP. L. REV. 473 (1981).

31. For a discussion of the extent to which the copyrightable expression of a program

Integrated circuits, whether memory circuits, processor circuits, or circuits controlling the input or output of data, are manufactured by a complex photo-lithographic process. In this process, a pattern of conductive lines and circuit components is designed, creating a "negative" from which integrated circuits can be manufactured.<sup>32</sup> The creator of an integrated circuit or "chip" first designs a series of circuit diagrams or "masks," with opaque and transparent regions that correspond to the pattern of the transistors of the chip. The masks are used to control a process by which material is deposited onto and etched from silicon (or other semiconductor) wafers. The resulting etched wafers are layered to produce an integrated circuit, which is then packaged in a larger ceramic or plastic housing.<sup>33</sup> There is an extremely high degree of miniaturization; while a semiconductor chip is typically much smaller than a fingernail, it may contain over 100,000 transistors—enough to operate a

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merges with the utilitarian components of the computer in such cases, see *infra* notes 76-92. The courts have held that such programs are copyrightable, even if they are stored on ROM chips. See *Apple II*, 714 F.2d at 1240. See also *Williams Elecs. v. Artic Int'l*, 685 F.2d 870 (3d Cir. 1982); *Tandy Corp. v. Personal Micro Computers*, 524 F. Supp. 171 (N.D. Cal. 1981). Although there is a possible logical distinction between regular software, embodied on a ROM chip, and operating system software similarly embodied, the courts have rightly rejected such a distinction. See *Apple II*, 714 F.2d at 1240. See also *Midway Mfg. Co. v. Artic Int'l*, 547 F. Supp. 999 (N.D. Ill. 1982), *aff'd*, 704 F.2d 1009 (7th Cir. 1983), *cert. denied*, 104 S. Ct. 90 (1983). The distinction between a ROM chip, embodying a copyrightable program, and, for example, a microprocessor chip, a utilitarian machine part embodying nothing, is as elusive as it is important. Even a member of the CONTU panel was confused:

Ask any citizen in the street whether a printed circuit in a microprocessor . . . is a copy of a literary work, and see what answer you get. But if our government . . . makes it law, what then happens to the citizen's sense of distinction between works that speak to the minds and senses of men and women and works that run machines—or, . . . the saving distinction between human beings themselves and machines themselves?

CONTU REPORT, *supra* note 8, at 33 (Hersey, Comm'r, dissenting).

Mr. Hersey's dissent betrays a misunderstanding of the nature of the controversy before him. Only a ROM, PROM, or other memory storage of a copyrightable program represents an embodiment of a copyrightable work. Attempts to obtain a copyright for masks of other types of chip, such as microprocessors, are a different matter. See *infra* notes 76-92 and accompanying text. Being able to copyright the expression of a novel, for example, certainly does not blur the line between people and books. See *Midway*, 547 F. Supp. at 999 (tangible object embodying the work is not the work itself but only a copy of the work). See also *Williams Elecs.*, 685 F.2d at 870 (program in ROM is a copy of the program).

32. Photo-lithographic masks are used to create memory circuits, as well as virtually every other sort of semiconductor circuit, including central processing units (CPUs). For a far more detailed and technical discussion, see HOUSE REPORT, *supra* note 4, at 11-14, 1984 U.S. CODE CONG. & AD. NEWS at 5760-63.

33. *Id.*

small computer.<sup>34</sup> Clearly, computer technology is rapidly expanding; yet it must be protected legally by a comparatively static body of law.<sup>35</sup>

Increasingly, hardware manufacturers are coming to rely upon computer-assisted design (CAD) equipment to help produce integrated circuit masks. An integrated circuit designer need only indicate the specifications of a desired integrated circuit, and the computer will then calculate the most efficient way to design the various conductive lines and circuit components. Such CAD assistance is vital, and becomes more so as circuits become increasingly complicated and dense.

It is important to note that circuits are not the only electro-mechanical devices subject to miniaturization. "Micro-machines" such as valves, pressure sensors, and gas chromatographs can also be etched onto a wafer.<sup>36</sup> The broad language of the law would not seem to exclude these "micro-machines" from copyright protection. As the trend toward miniaturization of circuits and mechanical functions continues, the potential impact of this law grows, perhaps in ways not foreseen by Congress.

### C. COPYRIGHT PROTECTION GENERALLY

The common methods of legal protection for intellectual property are patent,<sup>37</sup> copyright,<sup>38</sup> and trade secret<sup>39</sup> law. Copyright law offers

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34. HOUSE REPORT, *supra* note 4, at 2, 12-13, 1984 U.S. CODE CONG. & AD. NEWS at 5751, 5761-62.

35. Note that over twenty years passed between Congress' first consideration of revisions to the copyright law and the enactment of the Copyright Act of 1976. *See supra* text accompanying notes 41-42.

36. *See generally* Angell, Terry & Barth, *Silicon Micromechanical Devices*, SCI. AM., Apr. 1983, at 44.

37. In order to be patentable, the subject matter for which protection is sought must be within the statutorily prescribed class of invention, process, or improvement. 35 U.S.C. § 101 (1982). It must be novel, 35 U.S.C. § 102 (1982), and non-obvious to one skilled in the pertinent art. 35 U.S.C. § 103 (1982). These are indeed difficult criteria for software to meet.

The Supreme Court has held that the fact that a computer program is part of an otherwise patentable invention will not bar patentability. *Diamond v. Diehr*, 450 U.S. 175 (1981). *See also* *Parker v. Flook*, 437 U.S. 584, 590 (1978) ("[I]t is . . . clear that a process is not unpatentable simply because it contains . . . a mathematical algorithm."). Yet a Supreme Court opinion upholding the patentability of a computer program itself is unlikely, largely because "laws of nature" or "methods of doing business" are not patentable. *Gottschalk v. Benson*, 409 U.S. 63 (1972); *Hotel Sec. Checking Co. v. Lorraine Co.*, 160 F. 467 (2d Cir. 1908). *But cf. In re Freeman*, 573 F.2d 1237 (C.C.P.A. 1978) (patent claims allowed when program incorporated into machine claims). *See also* *Paine Webber v. Merrill Lynch*, 554 F. Supp. 1358 (D. Del. 1983) (district court allowed patent application to proceed for accounting program); Nycum, *Legal Protection For Computer Programs*, 1 COMPUTER L.J. 1 (1979); Roberts, *The Current Law Of Patent For Computer Software: Or Benson Revisited*, 1 COMPUTER L.J. 85 (1979).

38. The leading treatise on copyright law is M. NIMMER, *NIMMER ON COPYRIGHT*



the easiest method of establishing a legal right to exclude others from exploiting the subject protected, and seems best suited to protecting mass-marketed software.<sup>40</sup>

The United States operated for years under the Copyright Act of 1909.<sup>41</sup> This statute protected only published or registered works, leaving the protection of other works to the states. In 1955, recognizing the inadequacies of the copyright law in light of advancing technologies, the Copyright Office began a comprehensive program of research and studies. This began a twenty-one year process, ultimately leading to the enactment of the Copyright Act of 1976,<sup>42</sup> which substantially altered the existing law. The new Act afforded protection to works "fixed in any tangible medium of expression."<sup>43</sup> All "equivalent" state theories of recovery were preempted,<sup>44</sup> leading to a more unified, national body of copyright law.

In reforming the 1909 Act, Congress was unsure of how to deal with the issues presented by the growth of the information-processing industry, and formed the National Commission on New Technological

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(1985). The computer scientist may choose copyright protection because copyrights are more likely than patents to be upheld in court. See Silverman, *The Copyright Halo: A Comparison Of Judicial Standards For Copyrights And Patents*, 23 U. PITT. L. REV. 137 (1961).

39. A trade secret has been defined as "any formula, pattern, device or compilation of information which is used in one's business, and which gives him an opportunity to obtain an advantage over competitors who do not know or use it." RESTATEMENT OF TORTS § 757 comment b at 5 (1939). Note that trade secret law is not related to patent or copyright law, but has its basis in state law. Computer software may be eligible for trade secret protection. *Univ. Computing Co. v. Lykes-Youngstown Corp.*, 504 F.2d 518 (5th Cir. 1974); *Com-Share, Inc. v. Computer Complex, Inc.*, 338 F. Supp. 1229 (E.D. Mich. 1971), *aff'd*, 458 F.2d 1341 (6th Cir. 1972). As the name of the law implies, secrecy, or the existence of a confidential disclosure of information, is central. *Tri-Tron Int'l v. Velto*, 525 F.2d 432 (9th Cir. 1975); *K-2 Ski Co. v. Head Ski Co.*, 506 F.2d 471 (9th Cir. 1974). See generally R. MILGRIM, *TRADE SECRETS* (Business Organizations vols. 12-12B, 1985). Trade secret protection is probably inappropriate for integrated circuit masks. The ease with which chips can be reverse-engineered is a prime cause for concern among circuit manufacturers. See HOUSE REPORT, *supra* note 4, at 2, 1984 U.S. CODE CONG. & AD. NEWS at 5751.

40. Not requiring any registration, application, or maintenance of secrecy, copyright protection may begin as soon as the work is fixed in a tangible medium of expression. See 17 U.S.C. § 102 (1982). It makes no difference in what form such an expression is embodied so long as it can be "perceived, reproduced, or otherwise communicated for a period of more than transitory duration." See 17 U.S.C. § 101 (1982). While trade secrecy may provide some protection, it is difficult to maintain the requisite secrecy in mass-marketed products. *Videotronics v. Bend Elecs.*, 564 F. Supp. 1471 (D. Nev. 1983).

41. Ch. 320, 35 Stat. 1075 (1909) (repealed 1976).

42. See CONTU REPORT, *supra* note 8, at 3.

43. See 17 U.S.C. § 102 (1982).

44. See *id.* § 301. A state may neither abrogate nor in any way diminish federally granted copyright rights. *Mills Music v. Arizona*, 591 F.2d 1278 (9th Cir. 1979).

Uses of Copyrighted Works.<sup>45</sup> Pending examination of the issues by the Commission, Congress provided that the existing law with respect to computers remained unchanged.<sup>46</sup> The Commission submitted its report to Congress in 1978, and Congress accepted the Commission's recommendations in toto.<sup>47</sup> The report has been considered the legislative history for the 1980 amendments to the Copyright Act.<sup>48</sup> Under this new law, computer programs are expressly deemed to be writings, and thus fall within the protection of the federal copyright law.<sup>49</sup> The law also contains a fair use provision, allowing software buyers to create archival copies of programs.<sup>50</sup>

The statutory development of the copyright law was not sufficient to resolve the more pressing issues facing the computer and software industry. Whether copyright protection extended to operating system software embodied in ROM memory<sup>51</sup> was a cause of great dissent within the Commission.<sup>52</sup> This issue was resolved in favor of such protection in *Apple II*.<sup>53</sup> Remaining was the question of the extent of legal protection for integrated circuit masks.

## II. ASPECTS OF COPYRIGHT LAW PARTICULARLY APPLICABLE TO COMPUTER LAW ISSUES

### A. THE IDEA/EXPRESSION DICHOTOMY

The Copyright Act of 1976 provides that "[i]n no case does copyright protection for an original work of authorship extend to any idea, procedure, process, system, method of operation, concept, principle, or discovery, regardless of the form in which it is described, explained, illustrated, or embodied in such work."<sup>54</sup> This provision codified the judicially developed rule that copyright law protects the expression of an idea, but does not protect the idea itself.<sup>55</sup> The legislative history is

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45. See *supra* note 8.

46. Copyright Act of 1976, *supra* note 6, § 117, 90 Stat. at 2565 (codified at 17 U.S.C. § 117 (1982)).

47. Compare CONTU REPORT, *supra* note 8, at 12 with 1980 Amendments, *supra* note 8.

48. See 126 CONG. REC. 30,365 (1980) (statement of Sen. Bayh). See also *Apple II*, 714 F.2d at 1247, 1252.

49. Computer programs have been statutorily defined as "a set of statements or instructions to be used directly or indirectly in a computer in order to bring about a certain result." 17 U.S.C. § 101 (1982).

50. 17 U.S.C. § 117 (1982).

51. Such software is described *infra* note 30.

52. See CONTU REPORT, *supra* note 8, at 27-36.

53. See *infra* notes 111-31 and accompanying text.

54. Copyright Act of 1976, *supra* note 6, § 102(b), 90 Stat. at 2545 (codified at 17 U.S.C. § 102(b) (1982)).

55. See, e.g., *Atari, Inc. v. N. Am. Phillips Consumer Elecs. Corp.*, 672 F.2d 607 (7th

clear that the purpose of the statute was "to restate . . . that the basic dichotomy between expression and idea remains unchanged."<sup>56</sup> While other forms of protection—typically patent and trade secret law—protect ideas and inventions,<sup>57</sup> a copyright protects originality.<sup>58</sup>

There is extensive case law to support the statutory mandate that copyrights will not protect ideas. In the leading case, *Baker v. Selden*,<sup>59</sup> the plaintiff, who had obtained a copyright for his book describing certain accounting methods, brought suit against the defendant, who had later written another book describing variations on Selden's accounting approach. The Court stated that "[w]here the truths of a science or the methods of an art are the common property of the whole world, any author has the right to express the one, or explain and use the other, in his own way," and that to hold otherwise "would be a surprise and a fraud on the public."<sup>60</sup> Expanding this doctrine, a First Circuit decision held that copyright infringement will not be found in those cases in which the alleged infringer is using the expression "only as incidental to its use of the underlying idea."<sup>61</sup> Recently, a court held that when the art taught by the expression cannot be used without employing the methods used to express the idea, the expression lies in the public domain.<sup>62</sup>

Frequently, the expression of an idea and the idea itself appear to be inextricably intertwined. Can copyright protection be invoked in these cases? In order to find infringement, "substantial similarity" must be shown between the two works in question. Where idea and expression are merged, courts use a two-level "pattern" approach, articulated in *Nichols v. Universal Pictures Corp.*,<sup>63</sup> in analyzing whether a

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Cir. 1982); *Sid & Marty Krofft Television Prods. v. McDonald's Corp.*, 562 F.2d 1157 (9th Cir. 1977); *Nichols v. Universal Pictures Corp.*, 45 F.2d 119 (2d Cir. 1930), *cert. denied*, 282 U.S. 902 (1931); *Midway Mfg. Co. v. Bandai-Am., Inc.*, 546 F. Supp. 125 (D.N.J. 1982). See also B. KAPLAN, AN UNHURRIED VIEW OF COPYRIGHT 64-65 (1967).

56. H.R. REP. NO. 1476, 94th Cong., 2d Sess. 57, *reprinted in* 1976 U.S. CODE CONG. & AD. NEWS, 5659, 5670.

57. See *supra* notes 37, 39.

58. The level of originality required for a traditional copyright has been described as a bare "modicum." *Universal Athletic Sales v. Salkeld*, 511 F.2d 904, 908 (3d Cir. 1975). In the case of the quasi-copyright protection afforded the integrated circuit mask, however, the requirement of originality takes on a new meaning. Protection is denied if the work is staple, commonplace, or familiar. See *infra* notes 164-70 and accompanying text.

59. 101 U.S. 99 (1880).

60. *Id.* at 100, 102.

61. *Morrissey v. Proctor & Gamble Co.*, 379 F.2d 675 (1st Cir. 1967).

62. *Atari v. Amusement World*, 547 F. Supp. 222 (D. Md. 1981) (PAC-MAN game idea in the public domain).

63. 45 F.2d at 119. In discussing the intersection of idea and expression in a copyrighted work, Judge Hand wrote, "Nobody has ever been able to fix that boundary, and nobody ever can. . . . We have to decide how much [of a work consists of uncopyrightable

finding of actionable infringement would impermissibly protect the idea behind the expression. First, the most detailed pattern common to both works is distilled from a comparison of the works in issue.<sup>64</sup> The question then shifts to whether the "common pattern" is in the public domain.<sup>65</sup> The closer an idea represented by a work is to the idea's expression, the greater the likelihood that affording broad protection to the expression will impermissibly protect the underlying idea.<sup>66</sup> Consequently, courts have found that the scope of protection narrows as the idea and expression merge.<sup>67</sup> When they are identical, infringement will be found only if there is exact duplication of the plaintiff's work.<sup>68</sup>

*Morrissey v. Proctor & Gamble Co.*<sup>69</sup> is a case that illustrates this lack of protection for some expressions closely associated with an underlying idea. The plaintiff had copyrighted a set of rules for a sweepstakes involving the entrants' social security numbers. The defendant, later running a similar sweepstakes, printed a list of rules that was strikingly similar to the plaintiff's copyrighted rules. It was clear that the plaintiff could not prevent the defendant from running a similar contest. The plaintiff argued, however, that the defendant had infringed upon a valid copyright which protected the rules themselves. Noting the "almost precise similarity"<sup>70</sup> of plaintiff's and defendant's rules, the court nevertheless rejected plaintiff's argument, holding that the rules were not copyrightable:

When the uncopyrightable subject matter is very narrow, so that "the topic necessarily requires," . . . if not only one form of expression, at best only a limited number, to permit copyrighting would mean that a party or parties, by copyrighting a mere handful of forms, could exhaust all possibilities of future use of the substance. . . . We cannot recognize copyright as a game of chess in which the public can be

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ideas in the public domain], and while we are as aware as any one that the line, wherever it is drawn, will seem arbitrary, that is no excuse for not drawing it." *Id.* at 121, 122.

64. *See id.* at 120 *passim*. In determining infringement of a dramatic work, the court compared the essentially similar aspects of the two plays' story lines, holding that the similar aspects were in the public domain. *See also* S. REP. NO. 425, 98th Cong., 2d Sess. 16-18 (1984) (Committee report supporting S.1201, 98th Cong., 1st Sess., 129 CONG. REC. S5992 (daily ed. May 4, 1983), arguing that problem of determining substantial similarity in integrated circuit mask context is "more theoretical than real") [hereinafter cited as SENATE REPORT]. S.1201 was never passed, and the law finally adopted does not expressly incorporate the substantial similarity test. This Note argues that the present law should be construed to adopt such a test. *See infra* notes 133-75 and accompanying text.

65. *See Nichols*, 45 F.2d at 121, 122.

66. *See Sid & Marty Krofft Television*, 562 F.2d at 1168 (quoting *Herbert Rosenthal Jewelry Corp. v. Kalpakian*, 446 F.2d 738, 742 (9th Cir. 1971)).

67. *See, e.g., id.*

68. *Id.*

69. 379 F.2d at 675.

70. *Id.* at 678.

checkmated.<sup>71</sup>

Thus, because of the statutorily separate systems of copyright and patent law, courts have been firm in refusing to extend copyright protection to ideas.<sup>72</sup>

The test of substantial similarity, incorporating by reference issues of "common detailed patterns" and "public domain," has been used to determine infringement of computer software. The Chip Act, however, does not articulate a standard for determining infringement of a chip. The version of the law proposed by the Senate, and ultimately rejected, would have placed integrated circuits squarely within the purview of the copyright law, specifically adopting the "substantial similarity" test.<sup>73</sup> The Legislature, however, refused to adopt the copyright law test, largely because of perceived difficulties in applying a test designed for traditional creative expressions to utilitarian articles such as integrated circuit masks.<sup>74</sup> This Note argues that some form of the two-level substantial similarity test should be used in Chip Act cases.<sup>75</sup>

#### B. THE USEFUL ARTICLE DOCTRINE

Logically similar to the rule that copyright protects only the expression of an idea, and not the idea itself, is the useful article doctrine. This rule is similarly grounded in judicial observance of the distinction between copyright and patent law. The useful article doctrine provides that one may not obtain copyright protection for the useful or utilitarian aspects of the subject matter being copyrighted.<sup>76</sup>

In *Mazer v. Stein*,<sup>77</sup> an important case in this area, the plaintiffs had obtained a copyright for statuettes of human figures. These figures were incorporated into the bases of lamps sold by the plaintiffs, and copied by the defendants. The plaintiffs sued for copyright infringement. The defendants argued that the plaintiffs were attempting to copyright an article of manufacture which is subject to patent law.

The Court noted that the congressionally-mandated division between patent and copyright law prevented one from obtaining copyright protection for the "mechanical or utilitarian aspects" of the copyrighted matter.<sup>78</sup> The Court repudiated a possible interpretation of *Baker*, how-

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71. *Id.* at 678-79 (quoting *Sampson & Murdock Co. v. Seaver-Radford Co.*, 140 F. 539, 541 (1st Cir. 1905)). *But see* M. NIMMER, *supra* note 38, § 13.03[A] (viewing *Morrissey* as a "questionable" extension of the rule).

72. *See, e.g.*, *Dymow v. Bolton*, 11 F.2d 690 (2d Cir. 1926).

73. S. 1201, *supra* note 64.

74. *See infra* notes 133-75 and accompanying text.

75. *Id.*

76. *See* 17 U.S.C. §§ 102, 101 (1982). *See also* M. NIMMER, *supra* note 38, § 2.18.

77. 347 U.S. 201 (1954).

78. *Id.* at 218.

ever, by holding that a potential utilitarian use for a copyrightable expression does not bar copyright protection to the extent that the expression is not utilitarian: "We find nothing in the copyright statute to support the argument that the intended use or use in industry of an article eligible for copyright bars or invalidates its registration."<sup>79</sup>

In *Imperial Homes Corp. v. Lamont*,<sup>80</sup> the Fifth Circuit was faced with a similar issue. The plaintiff had copyrighted a set of architectural plans for a style of house that he built and sold. The defendant constructed his own house based upon the copyrighted architectural plans. He was sued not for selling copies of the plans themselves, but rather for constructing houses based on the plans. The court held that the plans, although themselves copyrightable, were not infringed by the house construction.<sup>81</sup>

This rule has been applied in many cases<sup>82</sup> and has been codified in the Copyright Act of 1976, which provides that "an article having an intrinsic utilitarian function that is not merely to portray the appearance of the article or to convey information"<sup>83</sup> shall not have copyright protection extended to the utilitarian functions of the subject matter.<sup>84</sup> Automobile wheel covers,<sup>85</sup> shapes of lighting fixtures,<sup>86</sup> watch faces,<sup>87</sup> shoe designs,<sup>88</sup> and the various levers and buttons of a game<sup>89</sup> are among the utilitarian articles which have been denied copyright protection. In many instances, there is no bright line dividing the utilitarian and expressive portions of certain subject matter, but the legislative history of the Copyright Act<sup>90</sup> and the case law interpreting it<sup>91</sup> are clear

79. *Id.*

80. 458 F.2d 895 (5th Cir. 1972).

81. *Id.* at 899.

82. *See infra* notes 85-89 and accompanying text.

83. 17 U.S.C. § 101 (1982).

84. 17 U.S.C. § 113(b) effectively incorporates by reference the judicially developed rule. The legislative history is equally clear:

Unless the shape of [the] product contains some element that, physically or conceptually, can be identified as separable from the utilitarian aspects of that article, the design would not be copyrighted under the bill. . . . [O]nly elements, if any, which can be identified separately from the useful article as such are copyrightable.

H.R. REP. NO. 1476, 94th Cong., 2d Sess. 55, *reprinted in* 1976 U.S. CODE CONG. & AD. NEWS 5659, 5668.

85. *See* *Norris Indus. v. ITT Corp.*, 696 F.2d 918 (11th Cir. 1983).

86. *See* *Esquire, Inc. v. Ringer*, 591 F.2d 796 (D.C. Cir. 1978), *cert. denied*, 440 U.S. 908 (1979).

87. *See* *Vacheron & Constantin-Le Coultre Watches v. Benrus Watch Co.*, 155 F. Supp. 932 (S.D.N.Y. 1957), *rev'd in part on other grounds*, 260 F.2d 637 (2d Cir. 1958).

88. *See* *SCOA Indus. v. Famolare, Inc.*, 192 U.S.P.Q. (BNA) 216 (S.D.N.Y. 1976).

89. *See* *Durham Indus. v. Tomy Corp.*, 630 F.2d 905 (2d Cir. 1980).

90. H.R. REP. NO. 1476, *supra* note 84.

91. *See supra* notes 88-92 and accompanying text.

that copyright protection extends only to those expressions that are "conceptually separable" from the utilitarian aspects of the subject matter.<sup>92</sup> In effect, if the aesthetically valuable element of a useful article is a part of the utilitarian aspect of the article, the test cannot be satisfied.

### III. APPLICATION OF THE IDEA/EXPRESSION DICHOTOMY AND THE USEFUL ARTICLE DOCTRINE TO COMPUTER TECHNOLOGY: *Apple Computer v. Franklin Computer Corp.*<sup>93</sup>

Apple manufactured the leading "Apple" microcomputer system. Apple computers are equipped with an operating system which is stored primarily on ROM memory chips. If the user buys a disk drive, additional operating system software necessary to operate the disk is supplied on a floppy diskette. In addition, several application programs are supplied with each computer.

Franklin began production of the "Franklin Ace 100," which was functionally equivalent to the Apple computer. Because Franklin copied exactly the copyrighted operating system of the Apple computer, any software which could operate on the Apple would operate on the Franklin Ace. Apple filed suit, alleging that Franklin was liable for copyright infringement. The case tested the limits of the copyright interest Apple owned in its operating system.

#### A. THE DISTRICT COURT OPINION<sup>94</sup>

The district court denied Apple's motion for a preliminary injunction, based on uncertainty about the extent of copyright protection for operating systems in ROM.<sup>95</sup> The court's holding was based on a mis-

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92. *Norris*, 696 F.2d at 924 (quoting *Kieselstein-Cord v. Accessories by Pearl*, 632 F.2d 989, 993 (2d Cir. 1980)).

93. 714 F.2d 1240 (3d Cir. 1983) [hereinafter cited as *Apple II*], *rev'g* 545 F. Supp. 812 (E.D. Pa. 1982) [hereinafter cited as *Apple I*], *cert. dismissed*, 104 S. Ct. 690 (1984).

94. *Apple I*, 545 F. Supp. at 812.

95. For a detailed analysis of the lower court's opinion, see Note, *Copyright Protection for Video Games, Computer Programs and Other Cybernetic Works*, 5 COMM/ENT 477, 489-500 (1983). The Note was published before the Third Circuit reversed the trial court holding in *Apple II*, 714 F.2d at 1240. The holding was in many respects discredited before it was handed down. See *Williams Elecs.*, 685 F.2d at 870; *Stern Elecs., Inc. v. Kaufman*, 669 F.2d 852 (2d Cir. 1982) (memory devices of video games sufficient fixation for copyright purposes); *Tandy Corp.*, 524 F. Supp. at 171 ("input-output routine" of home computer, imprinted on silicon chip, protected by copyright law). *But see Data Cash Sys. v. JS&A Group*, 480 F. Supp. 1063 (N.D. Ill. 1979), *aff'd on other grounds*, 628 F.2d 1038 (7th Cir. 1980) (object phase of computer program not protected). The trial court opinion, denying copyright protection to a program in ROM, was handed down before the 1980 Amendments, *supra* note 8. Further, the appellate court upheld on the grounds of insuf-

understanding of the relevant technology. This misunderstanding led to a misapplication of the useful article and idea/expression rules,<sup>96</sup> as modified by the 1980 amendments to the Copyright Act.<sup>97</sup>

### 1. *Useful Article Doctrine*

The court wrote that “[a]n operating system . . . is in a sense a part of the machine; it provides the functioning system that allows the user to progress in an orderly fashion as he moves through [using the computer].”<sup>98</sup> An operating system is, however, a *computer program*; it is created as any other program might be created.<sup>99</sup> As is the case for other computer programs, an operating system can ultimately control the operation of an electronic digital computer.<sup>100</sup> The failure to understand these facts was the cornerstone of the court’s error. Finding that operating system programs are inherently part of the computer, the court improperly applied the useful article doctrine.

The court cited the CONTU Report for the proposition that copyright protection would extend to programs fixed in a tangible medium of expression,<sup>101</sup> but that “[i]f it should prove possible to tap off [the electrical impulses of the ROM circuit] . . . perhaps . . . no infringement . . . would occur.”<sup>102</sup> The court thought that the facts “of course” presented just such an issue.<sup>103</sup> Apple sought to protect the operating system software its authors had created. The court misconstrued this request, believing that Apple was instead trying to obtain a copyright for the useful electrical impulses generated when such an operating system program was used. The court did not appreciate the extent to which the revised Copyright Act eliminated the useful article doctrine, as it applied to computer programs.

The court further misunderstood the nature of the case before it when it concluded that the Commission had not resolved the issues raised by programs encoded in ROM. In support, it cited a section of the CONTU Report relevant to the topographies of integrated circuits in general.<sup>104</sup> Yet there is a crucial distinction between a program

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ficient copyright notice only, implying that the programs thus embodied were, in fact, copyrightable.

96. See *supra* text accompanying notes 54-92.

97. *Supra* note 8.

98. *Apple I*, 545 F. Supp. at 814.

99. See *supra* note 29.

100. *Id.*

101. *Apple I*, 545 F. Supp. at 818 n.7 (citing CONTU REPORT, *supra* note 8, at 20).

102. *Id.* (quoting CONTU REPORT, *supra* note 8, at 22).

103. *Apple I*, 545 F. Supp. at 818 n.7.

104. *Id.* For a discussion of the question of copyright protection for integrated circuit mask topographies, see *infra* notes 133-75 and accompanying text.



stored on a ROM chip and the mechanical features of the ROM itself.<sup>105</sup> To support its view of the nature of the issues, the court cited the CONTU minority dissent by Commissioner Hersey for the proposition that programs in ROM were utilitarian in nature,<sup>106</sup> despite the fact that this view was rejected by the majority of the Commission. The court then implied that since operating systems in ROM might be patentable, copyrightability was precluded.<sup>107</sup>

Although the court did not expressly hold the operating system software unprotectible on useful article grounds, recognizing the court's mistaken analysis is pivotal to understanding the importance of the useful article doctrine as applied to computer-copyright issues. The court's analysis would have been different had the court understood that (1) an operating system in ROM controls computer operations no more than does any other admittedly copyrightable program, and (2) the Copyright Act makes the fact that the program is stored in ROM—the mode of fixation—legally irrelevant.

## 2. *Idea/Expression Dichotomy*

Similarly, the court misunderstood the application of the idea/expression dichotomy to the issues presented. Again, the decision does not make clear whether this doctrine was the basis for the denial of the injunction. The court, however, citing *Mazer*, did indicate that the idea/expression dichotomy required an examination of the extent to which the program could be understood by human readers.<sup>108</sup> Apparently, the court believed that a program which a person could not directly understand could not be termed "expression," or, alternatively, that the expression would merge with the utilitarian function of the program. The latter position confuses two separate considerations in the copyright law. The former position is clearly at odds with the revised Copyright Act, which provides that copyright protection extends to an original work of authorship which "can be perceived, reproduced, or otherwise communicated, either directly or with the aid of a machine or device."<sup>109</sup>

Although the lower court's opinion was at odds with the plain language and history of the Copyright Act, the decision is valuable. The position of the CONTU Commission certainly supports copyright pro-

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105. For an explanation of the relevant technology, see *supra* notes 32-33 and accompanying text.

106. *Apple I*, 545 F. Supp. at 818 n.7 (citing CONTU REPORT, *supra* note 8, at 27-31 (Hersey, Comm'r, dissenting)).

107. *Id.* at 824.

108. *Apple I*, 545 F. Supp. at 821 (citing *Mazer*, 347 U.S. at 201).

109. Copyright Act of 1976, *supra* note 6, § 102, 90 Stat. at 2545 (codified at 17 U.S.C. § 102 (1982)).

tection for works which have a utilitarian function. The lower court was perhaps justified in its reluctance to extend protection to a computer program which apparently so integrally controlled the mechanical operations of the host computer. The CONTU-inspired amendments to the Act have dramatically altered the scope of the judicially-created useful article doctrine, although not so dramatically as has the Chip Act.<sup>110</sup>

### B. THE APPELLATE COURT OPINION<sup>111</sup>

The lower court's application of the useful article doctrine and the idea/expression dichotomy to computer-copyright issues was short-lived, as the Court of Appeals for the Third Circuit reversed the district court opinion, specifically rejecting the lower court's views of both the useful article doctrine and the idea/expression dichotomy. The court held that operating system software, even when embodied in ROM circuits, was protectible under the Act. The court noted that it was "difficult to discern precisely why the district court questioned the copyrightability of the programs at issue since there [was] no finding, statement, or holding" which clearly set forth the lower court's view.<sup>112</sup> In examining the issues, the *Apple II* court focused on three substantive questions:<sup>113</sup> the copyrightability of object code, programs embodied on a ROM circuit, and operating system software.<sup>114</sup> These questions are best considered within the framework of the idea/expression dichotomy and the useful article doctrine.

#### 1. *Idea/Expression Dichotomy*

In considering the question of copyright protection for object code, the court relied heavily upon the CONTU Report,<sup>115</sup> finding that the CONTU Commissioners had intended computer programs to be considered literary works within the meaning of the Copyright Act.<sup>116</sup> The court reasoned that since the statutory definition of a computer program was broad, Congress had intended no legal distinctions between source and object code.<sup>117</sup> The court rejected the *Apple I* court's view that copyright validity depended upon the ability of the expression to be directly understood by human readers. Although the 1909 Copyright Act had been interpreted to deny copyright protection in those cases in

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110. Chip Act, *supra* note 14.

111. *Apple II*, 714 F.2d at 1240.

112. *Id.* at 1246.

113. The court also addressed a procedural issue not relevant here.

114. *Apple II*, 714 F.2d at 1246.

115. CONTU REPORT, *supra* note 8.

116. *Apple II*, 714 F.2d at 1247.

117. *Id.* at 1248 (citing *Williams Elecs.*, 685 F.2d at 870).

which the expression could not readily be perceived or understood by human readers,<sup>118</sup> the court found that the new Act expressly repudiated this rule.<sup>119</sup>

The court disagreed with the *Apple I* court's application of the idea/expression dichotomy to the question of operating system copyrightability.<sup>120</sup> The court observed that protection of an operating system would not serve to protect the underlying process or idea expressed by it, stating that "a 'process' is no more involved . . . than it would be if instructions were written in ordinary English in a manual which described the necessary steps to activate an intricate complicated machine, . . . [T]he medium is not the message."<sup>121</sup>

The court noted the difficulties involved in defining the distinction between the idea and its expression in operating system software.<sup>122</sup> It was clear that if Apple could exclude others from copying its operating system, it would retain a practical monopoly over the manufacture of devices which could operate fully Apple-compatible software. The court concluded that the distinction between idea and expression had to be "a pragmatic one, which also keeps in consideration 'the preservation of the balance between competition and protection reflected in the patent and copyright laws'."<sup>123</sup> In the court's view, the idea and expression were not merged if other programs could be written which performed the same functions as the Apple operating system.<sup>124</sup> Although the *Apple II* court noted that the district court had not made findings as to whether the Apple software represented the only method of making the expression, the court made it clear that mere compatibility with present software was not a legitimate consideration outweighing the interests of the copyright holders.<sup>125</sup>

The "pragmatic" considerations to which the court referred may well have included the extreme financial incentive provided by proprietary operating systems. Companies might not invest hundreds of thousands of dollars to develop an operating system if competitors could copy the system and receive the financial rewards without incurring any of the start-up costs.<sup>126</sup>

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118. See, e.g., *White-Smith Music Publishing Co. v. Apollo Co.*, 209 U.S. 1 (1908) (denying copyright protection for player-piano rolls, since they could not be understood without the aid of a machine).

119. *Apple II*, 714 F.2d at 1248.

120. *Id.* at 1250 (citing *Baker*, 101 U.S. at 99).

121. *Id.* at 1251.

122. *Id.* at 1250 n.8, 1253 (citing *Nichols*, 45 F.2d at 119).

123. *Id.* at 1253 (quoting *Herbert Rosenthal Jewelry Corp. v. Kalpakian*, 446 F.2d 738, 742 (9th Cir. 1971)).

124. *Id.*

125. *Id.*

126. See *infra* note 170 and accompanying text.

## 2. *Useful Article Doctrine*

The *Apple II* court also rejected Franklin's useful article doctrine attack on the operating system copyright, relying upon the CONTU Commission's position that the ultimate useful purpose to which all software is put should not bar the copyrightability of the expression.<sup>127</sup> The fact that operating system software may seem more logically connected to the inner workings of the computer than applications software was not relevant to the court.<sup>128</sup> The court summarily disposed of the useful article objection to copyright protection for programs embodied in ROM circuits,<sup>129</sup> largely because it had recently decided that issue in *Williams Electronics*.<sup>130</sup> The court distinguished programs embodied in ROM circuits from the circuits themselves.<sup>131</sup>

In *Apple II* the court resolved one of the more pressing legal questions facing the computer industry. The court was never asked, however, to protect more than a particular embodiment of a concededly creative expression. Once the 1980 Amendments made it clear that the useful article doctrine would not bar copyright protection for computer programs, the result in *Apple II* was inevitable. A far different question, not addressed by the 1980 Amendments, arises when the courts and legislature are asked to protect non-expressive integrated circuit chips and masks, which do not embody any computer programs.

## IV. PROTECTION OF INTEGRATED CIRCUIT MASKS

President Reagan has recently signed legislation which further erodes the distinction between idea and expression, between patent and copyright, and between utilitarian article and expression.<sup>132</sup> The law elegantly tailors elements of patent and copyright law to the needs of the semiconductor industry. Although not fully an extension of the copyright laws, the new law can best be viewed in light of the useful article doctrine and the idea/expression dichotomy.

### A. THE PRIOR LAW

Before the Chip Act was passed, the degree of legal protection for integrated circuit masks was uncertain; CONTU had avoided the is-

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127. *Apple II*, 714 F.2d at 1253.

128. *Id.* at 1251. Note, however, that Commissioner Hersey, dissenting from the majority opinion of the CONTU Commission, had suggested that copyright might extend only to those programs that communicate in some way with the user. CONTU REPORT *supra* note 8, at 28-29.

129. *Apple II*, 714 F.2d at 1249.

130. 685 F.2d at 870.

131. *Apple II*, 714 F.2d at 1249.

132. Chip Act, *supra* note 14.

sue,<sup>133</sup> and there were no court holdings directly on point.<sup>134</sup> There were indications from certain administrators that integrated circuit masks were not copyrightable.<sup>135</sup> Scholarly commentary, although sparse, also argued against such protection.<sup>136</sup>

The traditional useful article doctrine, as developed by the courts, controlled the analysis of the extent of legal protection for integrated circuit masks. Although under this doctrine a copyrightable program is not rendered unprotectible simply because it is stored on a ROM circuit,<sup>137</sup> this does not necessarily extend copyright protection to circuit designs and masks. It is crucial to remember the distinction between a memory circuit which, as a method of embodiment for a computer program, is itself protected by the Act, and the series of miniature wires, etched wafers of semiconductor, and other components which comprise the integrated circuits themselves.<sup>138</sup> For example, one might speak loosely about "copyrighting a book." The author's copyright, however, does not protect the physical, three-dimensional pages, cover, and binding of the book; the copyright protects the expression of the ideas it contains. Similarly, while a copyright clearly obtained for a program contained in a ROM circuit after the *Apple II* decision,<sup>139</sup> the protection afforded the embodiment itself was an open question. As the *Apple II* court stated, "the medium is not the message."<sup>140</sup>

Before the Chip Act was passed, some manufacturers had attempted to obtain copyright protection for the masks used to imprint

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133. In its Report, the Commission stated, "[T]hese recommendations do not deal with each and every technological issue affecting the interests of copyright users and owners. Specific topics may deserve congressional attention. [These include] protection for the topography or layout of microcircuit chips." CONTU REPORT, *supra* note 8, at 79.

134. In distinguishing programs embodied in ROM from the ROM itself, for purposes of copyrightability, the *Apple II* court implied—but did not hold—that a different result would obtain if the copyrightability of the ROM or mask itself were in issue. *Apple II*, 714 F.2d at 1249. See also SENATE REPORT, *supra* note 64, at 7 (*Apple II* does not affect copyrightability of integrated circuits).

135. See, e.g., *Copyright Protection for Imprinted Design Patterns on Semiconductor Chips, 1979: Hearing on H.R. 1007 Before the Subcomm. on Courts, Civil Liberties, and the Administration of Justice of the House Comm. on the Judiciary*, 96th Cong., 1st Sess. 19 (1979) (statement of Jon Baumgarten, General Counsel, Copyright Office). See also HOUSE REPORT, *supra* note 4, at 3-4, 1984 U.S. CODE CONG. & AD. NEWS at 5752-53 ("Copyright law has always considered a mask work to be purely utilitarian, and therefore outside the scope of copyright protection.").

136. For a detailed and thoughtful article which analyzes the problems faced in protecting proprietary rights in integrated circuit masks and urges a change in the law, see Oxman, *Intellectual Property Protection and Integrated Circuit Masks*, 20 JURIMETRICS J. 405 (1980).

137. See *Apple II*, 714 F.2d at 1240.

138. See *supra* note 32 and accompanying text.

139. See *Apple II*, 714 F.2d at 1240.

140. *Id.* at 1251.

silicon wafers with the conductive lines and components comprising the circuits.<sup>141</sup> As discussed earlier, the mask used in the design and preparation of an integrated circuit is really a "blueprint" of sorts. The masks are used, through a photo-lithographic process, to imprint circuits on pieces of semiconductor, which in turn are layered with other such pieces to form integrated circuits.<sup>142</sup> Some manufacturers argued that an integrated circuit is an embodiment of an artistic work—the design of the circuit—and that copying it would constitute infringement. Under this theory, integrated circuit developers sought to copyright the masks used to create integrated circuits.<sup>143</sup>

This argument fails when considered in light of the holding in *Imperial Homes*.<sup>144</sup> Because of the way integrated circuits are manufactured, the finished product is actually an architectural representation of the original mask.<sup>145</sup> The finished integrated circuit embodies nothing but the useful features of the original circuit design; the only purpose served by the various conductive lines and representations of the original mask is the direction of current flow, memory storage, and other utilitarian functions.<sup>146</sup> Just as a contractor uses architectural blueprints to build a house, so does a computer manufacturer use integrated circuit masks to create an electronic integrated circuit. Copying the architectural representation of the circuit mask is equivalent to copying a house. Although the house represents the blueprints or "mask" used to create it—which may be copyrightable<sup>147</sup>—copying the house is not considered infringement under the law.<sup>148</sup> Were this not the result, a house could be viewed as an "embodiment" of a copyrightable set of blueprints, preventing anyone from copying it. This would be clearly contrary to the holding of *Imperial Homes*.<sup>149</sup>

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141. See Oxman, *supra* note 136, *passim*.

142. See *supra* note 32 and accompanying text. The mask is, in effect, a photographic negative used to imprint conductive lines upon a semiconductor surface, just as a set of blueprints is used to lay out building materials upon a floorplan. Indeed, the mask is more like a useful article than blueprints are, since the mask itself is used directly to create the finished chip, while blueprints are used somewhat more indirectly by the builders, as guidelines. See also Oxman, *supra* note 136, at 808-10.

143. See Oxman, *supra* note 136, *passim*.

144. 458 F.2d at 895.

145. See *supra* note 32 and accompanying text.

146. *Id.*

147. The argument was raised in the *Apple I* court that even operating systems are not copyrightable under the useful article doctrine. Absent any statutory guidance, this argument might have been compelling, since programs certainly "do" something beyond mere expression, and copyright protection is sought for precisely those utilitarian functions. But the language of the 1980 Amendments indicated Congress' desire to protect original programs with the copyright law.

148. See *Imperial Homes*, 458 F.2d at 895.

149. *Id.*

## B. THE LEGISLATIVE RESPONSE

In response to concerns voiced by the semiconductor industry, H.R. 1028 was introduced in the House.<sup>150</sup> This bill specifically provided in section two that masks and mask works were not to be considered pictorial, graphic, or sculptural works, within the present meaning of the Act. Presumably, the effect of this rule would have been to place semiconductor chips in the category of "audio-visual works," a category scarcely realistic when considering the nature of integrated circuit masks.<sup>151</sup> This approach would, however, have placed chips under the protection of the traditional copyright laws. Eventually, H.R. 5525 was substituted for H.R. 1028.<sup>152</sup> After passing H.R. 5525, the House vacated passage and substituted an amended version of S. 1201.<sup>153</sup> S. 1201 retained circuit protection under the aegis of the copyright scheme, explicitly adopting in section two a "substantial similarity" test of infringement. Ultimately, S. 1201 evolved into H.R. 6163.<sup>154</sup> This bill abandoned the traditional copyright approach in favor of a *sui generis* quasi-copyright scheme. The bill was recently signed into law by President Reagan.<sup>155</sup>

1. *The Structure of the Law: The Useful Article and Idea/Expression Doctrines Revisited*

The law presents a novel challenge for attorneys and courts, and is extremely broad-reaching.<sup>156</sup> Because of the special problems associated with the protection of utilitarian articles of commerce, the Legislature has created an entirely new form of intellectual property protection, a hybrid of traditional patent and copyright law.<sup>157</sup> Under the law, a mask work may be copied if the purpose of such copying is "solely" to teach, analyze, or evaluate the concepts or techniques em-

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150. 98th Cong., 1st Sess., 129 CONG. REC. H201 (daily ed. Jan. 27, 1983).

151. See *supra* note 32.

152. 130 CONG. REC. H3127 (daily ed. Apr. 26, 1984).

153. S. 1201, 98th Cong., 2d Sess., 130 CONG. REC. H5524-25 (daily ed. June 11, 1984). Several other bills have been unsuccessfully introduced in recent years addressing the measure of protection to be afforded semiconductor chips. See, e.g., H.R. 1007, 96th Cong., 1st Sess., 125 CONG. REC. 461 (1979); H.R. 7207, 97th Cong., 2d Sess., 128 CONG. REC. H7937 (daily ed. Sept. 29, 1982); S. 3117, 97th Cong., 2d Sess., 128 CONG. REC. S15,484 (daily ed. Dec. 16, 1982).

154. See 130 CONG. REC. S12,909, 12,913 (daily ed. Oct. 3, 1984).

155. Chip Act, *supra* note 14. The relevant sections of the Chip Act are reproduced *infra* Appendix A.

156. For example, the Act prohibits the sale of completed "box-level" products that are made with infringing chips. 17 U.S.C. § 901(b) (Supp. II 1985).

157. Importantly, the Act expressly deems other sections of the Copyright Act inapplicable to semiconductor chip protection. 17 U.S.C. § 912(b) (Supp. II 1985).

bodied in the mask.<sup>158</sup> This language tracks that of the Senate version of the legislation.<sup>159</sup> The Senate version, however, was silent as to the scope of this reverse-engineering right. Significantly, the law now clearly provides that a person may not only examine an integrated circuit, but may also use what he or she learns from that examination commercially.<sup>160</sup>

Once the right is established to use, commercially, knowledge gleaned from examining and copying chips, it is difficult to predict where the line will be drawn between permissible examination with later use and impermissible copying. In a traditional copyright infringement case, it is assumed that there is an absolute right to derive ideas from a copyrighted work, and to use those ideas freely,<sup>161</sup> unless such use involves substantial similarity to the first expression of the idea.<sup>162</sup>

While the law has to some extent defined the actions which will not infringe upon the owner's monopoly grant, it is peculiarly silent about what does constitute infringement. The Senate version of the Chip Act, which would have placed mask works squarely within traditional copyright protection, specifically adopted the substantial similarity test for determining whether a given chip infringed upon a protected mask work.<sup>163</sup> The version of the law ultimately adopted, however, does not address the issue. Can it be inferred that the Legislature, in rejecting the Senate version, sought to prohibit only exact duplication of an entire protected mask? Or does the law make illegal even the inadvertent duplication of trivial elements of a protected work? An examination of the new law through the framework of the useful article and idea/expression doctrines provides a response.

It is clear that the law does not prohibit duplication of minor elements of a mask work which are in the public domain. Section 902(b) of the law provides:

Protection under this chapter shall not be available for a mask work that—

- (1) is not original; or
- (2) consists of designs that are staple, commonplace, or familiar in the semiconductor industry, or variations of such designs, combined in a way that, considered as a whole, is not

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158. 17 U.S.C. § 906(a)(1) (Supp. II 1985).

159. S. 1201, *supra* note 153, sec. 5(a), 130 Cong. Rec. at H5525.

160. 17 U.S.C. § 906(a)(2) (Supp. II 1985).

161. *See supra* notes 54-72 and accompanying text; *cf.* 17 U.S.C. § 902(c) (Supp. II 1985).

162. *See Nichols*, 45 F.2d at 119. In discussing S. 1201, which was not passed, the Senate Report suggests that Congress was not concerned with difficulties inherent in applying traditional tests of copyright infringement to integrated circuits. After noting the difficulties involved, the Report states that "the question is more theoretical than real, because of the business realities of the chip industry." SENATE REPORT, *supra* note 64, at 17.

163. *See* S. 1201, *supra* note 153, sec. 2, 130 CONG. REC. at H5524.



original.<sup>164</sup>

Thus, the limits of "mask force"<sup>165</sup> are in some ways similar to the limits of patent law. While the level of originality required for a traditional copyright has been described as a bare modicum,<sup>166</sup> the Chip Act denies protection to mask works which are staple or commonplace. Thus, the law introduces a threshold requirement of innovation and originality not found in the traditional copyright laws. The Senate version of the law would have included mask works in the list of articles protected by traditional copyright law, and thus would not have expressly introduced this novelty requirement.<sup>167</sup> Note, however, that the two-level abstraction test typically used in copyright infringement cases involves a comparison of the elements common to the plaintiff's and defendant's works with elements in the public domain.<sup>168</sup> It seems probable, given the Legislature's goal of preventing infringers from riding innovators' coattails, that the Chip Act should be construed to avoid giving protection to trivial advances over the existing art that might otherwise have been protected under a traditional copyright view.

While patent law requires that an invention be non-obvious to one skilled in the pertinent art,<sup>169</sup> the Chip Act denies protection to a mask work which is "staple, commonplace, or familiar" in the industry. Although the two standards are very similar, the patent law reference to "one skilled in the pertinent art" seeks to invoke a higher standard than mere industry usage in deciding whether protection will be granted. While the Chip Act has the same goal, the requirement that the mask work not be commonplace is not identical to the patent law requirement that an article not be obvious. Both restrictions are consistent with the sound policy of avoiding a monopoly grant where such a grant is not in the public interest. Innovation, research, and development are not fostered by a law which rewards novelty and redundancy equally. Thus the new law reconciles the apparent conflict between the useful article doctrine as applied in traditional copyright law and the realities of integrated circuit manufacture.

Although the new law incorporates the patent law's perspective on utilitarian article protection, it nonetheless adopts a traditional copy-

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164. 17 U.S.C. § 902(b) (Supp. II 1985).

165. The term "mask force" is coined by the statute. *Id.* § 909 ("The owner of a mask work provided protection under this chapter . . . may affix notice to the mask work . . . . The notice . . . shall consist of—(1) the words 'mask force'. . .").

166. *See supra* note 58. An author need contribute only "more than a 'merely trivial' variation" beyond the public domain. *Alfred Bell & Co. v. Catalda Fine Arts, Inc.*, 191 F.2d 99, 102-03 (2d Cir. 1951).

167. S. 1201, *supra* note 153, 130 CONG. REC. at 5524.

168. *See supra* notes 63-65 and accompanying text.

169. *See supra* note 37.

right approach to the idea/expression dichotomy. Section 902(c) of the law provides:

In no case does protection under this chapter for a mask work extend to any idea, procedure, process, system, method of operation, concept, principle, or discovery, regardless of the form in which it is described, explained, illustrated, or embodied in such work.<sup>170</sup>

Like traditional copyright law, the Chip Act grants no monopoly interest to innovative *methods* of creating integrated circuit masks. Because of the threshold requirement that circuit masks be novel to obtain protection under the statute, however, there will still remain an incentive to innovate.

The traditional two-level abstraction test for determining substantial similarity in copyright infringement claims is grounded in the idea/expression dichotomy.<sup>171</sup> The fact that the copyright notion of the idea/expression dichotomy is expressly retained in the Chip Act suggests that some form of the substantial similarity infringement test remains in the new law. The law thus manages to reconcile the conflicting aims and operations of patent and copyright law.

Before the Chip Act was passed, semiconductor manufacturers faced a real threat from "chip pirates," who engaged in blatant wholesale copying under then uncertain copyright laws. The obvious danger was that chip manufacturers would reduce research and development expenditures, fearing that these expenses could not be recouped because of competition from pirates with negligible overhead.<sup>172</sup> This reduction in research and development could have led to a decline in employment expansion and global technological superiority. Under the new law, regardless of how one interprets the test of infringement, wholesale duplication of protected circuits is clearly prohibited. If a mask work is not the product of substantial research and development, it probably does not represent a sufficient advance in technology to warrant protection. Thus, the law affords a monopoly interest only to those works which represent an investment of the type the law was designed to foster. Yet the law, through its recognition of the idea/expression dichotomy, does not create an excessive monopoly grant. The protection afforded is closely tailored to the legitimate aims of the statute.

### C. APPLICATION OF THE LAW

Although the Chip Act is silent on the standard for determining in-

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170. 17 U.S.C. § 902(c) (Supp. II 1985).

171. See *supra* notes 63-68 and accompanying text.

172. See HOUSE REPORT, *supra* note 4, at 2-3, 1984 U.S. CODE CONG. & AD. NEWS at 5751 ("The development costs for a single new chip can reach \$100 million. A competing firm can . . . for a cost of less than \$50,000 duplicate the mask work of the innovating firm.").

fringement, courts must have some benchmark by which to judge alleged infringement of protected works. Of course, the case in which an infringer pirates an entire mask work presents no complex question of statutory interpretation. Whatever the interpretation of infringement, such piracy is clearly forbidden. When the alleged infringer has appropriated only certain elements of the plaintiff's mask, however, or has created a mask strikingly similar in design or execution, the bare language of the statute provides little guidance.

The two-level abstraction test is rooted in the traditional distinction between the public domain of ideas and the private monopoly afforded expressions. It seems reasonable that by retaining the idea/expression dichotomy in section 902(c), the Chip Act would best be applied through an appropriately modified two-level abstraction test. Such an approach would fairly balance the competing interests of mask designers who need to take advantage of current technology, yet still preserve the proprietary nature of their work.

As a threshold, the court should look to the state of the art in integrated circuit design, to determine whether the plaintiff's mask warrants protection. The law affords no monopoly grant for masks which are not original.<sup>173</sup> Mask works that are staple and commonplace are in the public domain.

Next, to determine whether any infringement has taken place, the allegedly infringing work should be compared with the plaintiff's mask, and all common elements identified. This is closely analogous to the first level of the two-level abstraction test used in traditional copyright infringement cases.<sup>174</sup> Since protection does not extend beyond the "expression" of the mask,<sup>175</sup> only elements of both masks which are exactly identical should be considered in this comparative stage. Finally, the common elements should be considered in light of the prevailing state of the art in the semiconductor industry. If the common elements are not within the public domain, infringement is established.

## CONCLUSION

Despite false starts, the law of intellectual property has been flexible in meeting the needs of the changing computer industry. The legislature and the courts have modified some of the traditional rules of copyright law, particularly in the software area, in an attempt to accommodate this industry. The modifications have been wholly consistent

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173. 17 U.S.C. § 902(b) (Supp. II 1985).

174. The traditional test for substantial similarity between a work and an allegedly infringing work involves an examination of the extent to which the pattern common to both works is in the public domain. *Id.*

175. *See* 17 U.S.C. § 902(c) (Supp. II 1985).

with and closely tailored to the special needs of the industry and society.

The Semiconductor Chip Protection Act of 1984 is an example of the evolution of traditional laws to meet new needs. The Act provides a *sui generis*, quasi-copyright scheme for protecting the proprietary interests of integrated circuit mask designers and manufacturers. The law incorporates an element of patent law, in that it requires masks to be original and non-staple before any protection can be granted. It retains, however, many elements of copyright law, such as the idea/expression dichotomy, which is at the core of computer-copyright issues generally. Although the law is silent on the question, it appears that the two-level abstraction test of substantial similarity has been borrowed from the copyright law to form the test for determining infringement. Under this test, common elements of the mask works in question are compared, first with each other, and then with the state of the public domain of integrated circuit design.

Doubtless it was difficult for Congress to reconcile the historical limitations on copyright protection with the problems facing the semiconductor industry. Unfortunately, the crucial standard of determining infringement was omitted from the law in its final form. However, a fair reading of the statute in the context of its legislative history, and the copyright law generally, suggests that a substantial similarity/two-level abstraction test be applied to determine infringement of a mask work.

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## APPENDIX A

## Semiconductor Chip Act of 1984

“§ 901. . . .

“(a) As used in this chapter \* \* \*

“(1) a ‘semiconductor chip product’ is the final or intermediate form of any product—

“(A) having two or more layers of metallic, insulating, or semiconductor material, deposited or otherwise placed on, or etched away or otherwise removed from, a piece of semiconductor material in accordance with a predetermined pattern; and

“(B) intended to perform electronic circuitry functions;

“(2) a ‘mask work’ is a series of related images, however fixed or encoded—

“(A) having or representing the predetermined, three-dimensional pattern of metallic, insulating, or semiconductor material present or removed from the layers of a semiconductor chip product; and

“(B) in which series the relation of the images to one another is that each image has the pattern of the surface of one form of the semiconductor chip product; in a way that, considered as a whole, is not original.

“(C) In no case does protection under this chapter for a mask work extend to any idea, procedure, process, system, method of operation, concept, principle, or discovery, regardless of the form in which it is described, explained, illustrated, or embodied in such work.

. . .

“§ 905. . . .

“The owner of a mask work provided protection under this chapter has the exclusive rights to do and to authorize any of the following:

“(1) to reproduce the mask work by optical, electronic, or any other means;

“(2) to import or distribute a semiconductor chip product in which the mask work is embodied; and

“(3) to induce or knowingly to cause another person to do any of the acts described in paragraphs (1) and (2).

“§ 906. . . .

“(a) Notwithstanding the provisions of section 905, it is not an infringement of the exclusive rights of the owner of a mask work for—

“(3) a mask work is ‘fixed’ in a semiconductor chip product when its embodiment in the product is sufficiently permanent or stable to permit the mask work to be perceived or reproduced from the product for a period of more than transitory duration;

. . .

“(b) For purposes of this chapter . . . the distribution or importation of a product incorporating a semiconductor chip product as a part thereof is a distribution or importation of that semiconductor chip product.

“§ 902. . . .

“(a)(1) Subject to the provisions of subsection (b), a mask work fixed in a semiconductor chip product, by or under the authority of the owner the mask work, is eligible for protection under this chapter . . .

“(b) Protection under this chapter shall not be available for a mask work that—

“(1) is not original; or

“(2) consists of designs that are staple, commonplace, or familiar in the semiconductor industry, or variations of such designs, combined

“(1) a person to reproduce the mask work solely for the purpose of teaching, analyzing, or evaluating the concepts of techniques embodied in the mask work or the circuitry, logic flow, or organization of components used in the mask work; or

“(2) a person who performs the analysis or evaluation described in paragraph (1) to incorporate the results of such conduct in an original mask work which is made to be distributed.

. . .

“§ 911. . . .

“(b) Upon finding an infringer liable, to a person entitled under section 910(b)(1) to institute a civil action, for an infringement of any exclusive right under this chapter, the court shall award such person actual damages suffered by the person as a result of the infringement. The court shall also award such person the infringer’s profits that are attributable to the infringement and are not taken into account in computing the award of actual damages. . . .

“(c) At any time before final judgment is rendered, a person entitled to institute a civil action for infringement may elect, instead of actual damages and profits as provided by subsection (b), an award of statutory damages for all infringements involved in the action, with respect to any one mask

work for which any one infringer is liable individually, or for which any two or more infringers are liable jointly and severally, in an amount not more than \$250,000 as the court considers just.

. . .

“(f) In any civil action arising under this chapter, the court in its discretion may allow the recovery of full costs, including reasonable attorneys’ fees, to the prevailing party.

“§ 912. . . .

“(a) Nothing in this chapter shall affect any right or remedy held by any person under chapters 1 through 8 of this title, or under title 35.

“(b) Except as provided in section 908(b) of this title, references to ‘this title’ or ‘title 17’ in chapters 1 through 8 of this title shall be deemed not to apply to this chapter.”

. . .